SEE3002: ENERGY AND ENVIRONMENTAL ECONOMICS

Effective Term
Semester A 2023/24

Part I Course Overview

Course Title
Energy and Environmental Economics

Subject Code
SEE - School of Energy and Environment
Course Number
3002

Academic Unit
School of Energy and Environment (E2)

College/School
School of Energy and Environment (E2)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract

This course aims to initiate students into the fields of energy and environmental economics and the economics of collectively shared resources. Students will become conversant with the language and methods of energy and environmental economics and be able to create applications of these methods to real-world problems. They will learn and use terminology such as externalities, public goods, common property resources, marginal cost pricing, cost-benefit analysis, and many other terms and the practical applications of these concepts. They will understand the economic principles and practices behind the use of market instruments to conserve energy resources and to discover the price of, and control environmental impacts, including taxation, feed-in tariffs, and other features of current and future economics-based methodologies, analyses, laws, standards, and regulations, and they will be able to innovate solutions to environmental problems by applying these principles.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Define and identify externalities associated with various types of market transactions and describe and explain ways of discovering their shadow prices or values and internalizing them	15	x		
2	Define and identify examples of public goods, common property resources, and other types of collectively shared resources and describe market failure modes associated with each and means of remedying them	15	x		
3	Design ways of charging for and paying for energy and natural resources such that their use will be economically optimal and sustainable and will also produce adequate returns on investment for their providers	15		x	x
4	Describe and apply innovative techniques of non-market valuation to estimate the demand for environmental quality or the cost of environmental degradation	10	x		
5	Design and critically evaluate from an economic perspective public policies associated with energy and the environment	10		x	x
6	Apply and critically evaluate cost-benefit analyses of energy and environmental policies and projects	10		x	
7	Analyse and evaluate energy projects using internal rate of return on investment, net present value, and payback period methodologies	10	x		
8	Understand and be able to join intelligently in debates as an aid in the discovery of innovative applications of economics to energy and the environment	15		x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Classroom lectures	Learning in the presence of the teacher	1, 2, 3, 4, 5, 6, 7, 8	
2	Videos and other visual aids	Slide and videos are used to support the course content.	1, 2, 3, 4, 5, 6, 7, 8	
3	In-class student debates	The teacher will regularly ask questions.	1, 2, 3, 4, 5, 6, 7, 8	
4	Group projects for class presentation	Projects will be made by the student that require to use the content of the course.	1, 2, 3, 4, 5, 6, 7, 8	
5	Homework problems for discussion and solution	Homework and problems are used to apply the content of the course and to train the students.	1, 2, 3, 4, 5, 6, 7, 8	
6	Final examinations	Students should also learn from the exercises and the questions they have to do during the exam.	1, 2, 3, 4, 5, 6, 7, 8	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Homework problems	1, 2, 3, 4, 5, 6, 7, 8	20	
2	Student projects	1, 2, 3, 4, 5, 6, 7, 8	20	
3	In-class debates	1, 2, 3, 4, 5, 6, 7, 8	20	

Continuous Assessment (%)

60

Examination (%)

40

Examination Duration (Hours)

2

Additional Information for ATs

Examination duration: 2 hrs
Percentage of coursework, examination, etc.: 60% by coursework; 40% by exam

To pass a course, a student must do ALL of the following:
1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);

2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

Assessment Rubrics (AR)

Assessment Task

1. Homework

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

2. In-class debates

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

3. Student projects

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Assessment Task

4. Examination

Criterion

Ability to analyse and solve problems related to energy and environmental economics.

Excellent (A+, A, A-)

Demonstrates superior creativity, originality, or understanding in approach, content, or presentation to analyse and solve problems related to energy and environmental economics.

Good (B+, B, B-)

Demonstrates creativity, originality, or understanding beyond basic expectations to analyse and solve problems related to energy and environmental economics.

Fair (C+, C, C-)

Meets basic expectations for presentation, approach and content to analyse and solve problems related to energy and environmental economics.

Marginal (D)

Below average in presentation, approach, understanding or content to analyse and solve problems related to energy and environmental economics.

Failure (F)

Not even reaching marginal levels of skills to analyse and solve problems related to energy and environmental economics.

Additional Information for AR

For in-class debate: evaluated based on contents (e.g., clearly states purpose or motivation for study; methods and findings clearly stated, consistent with results; mentions limitations or future research directions), presentation style (e.g., good poise, effective interactions with viewers; organized explanations; can communicate with general audience), response to questions and comments (e.g., confident and effective response to questions).

For student projects: evaluated based on scientific merit and writing.

Part III Other Information

Keyword Syllabus

a. Introduction to economics; introduction to microeconomics (3 Lectures). Keywords: invisible hand, incentives, marginality, supply/demand curves, market equilibrium, optimum
b. Externalities, market failure, Pigovian fees, and the efficient level of pollution (2 Lectures). Keywords: externalities, internalizing externalities, market failure, polluter pays principle, Coase theorem, taxes
c. Public goods, private goods, rival goods, excludable goods, and common property resources (2 Lectures). Keywords: rival and excludable goods, public and private goods, common property resources, tragedy of the commons
d. Cost-benefit analysis; project evaluation (1 Lecture). Keywords: cost-benefit ratio, present value, private/social discount rate, payback period
e. Energy economics (2 Lectures). Keywords: marginal cost / average cost pricing, time of day pricing, congestion pricing, baseload / peak load, feed-in tariff

Reading List

Compulsory Readings

	Title
1	Jonathan M. Harris and Brian Roach, Environmental and Natural Resource Economics: A Contemporary Approach, Fourth Edition, Routledge (2018).
2	Perman R., Ma Y. and McGuilvray J. : Natural Resources and Environmental Economics, Pearson Education 3rd ed., 2011.
3	Tom Tietenberg and Lynne Lewis, Environmental and Natural Resource Economics, 10th Edition, Routledge (2016).

Additional Readings

	Title
1	Varian H. : Intermediate Microeconomics, W.W. Norton 9th ed., 2014.
2	Stephen Smith, Environmental Economics: A Very Short Introduction, Oxford University Press (2011).
3	Robert Falkner, ed., The Handbook of Global Climate and Environmental Policy, Wiley-Blackwell (2016).
4	Christine Greenhalgh and Mark Rogers, Innovation, Intellectual Property, and Economic Growth, Princeton University Press (2010).
5	J.D. Angrist and J.S. Pischke, Mastering 'Metrics: The Path from Cause to Effect, Princeton University Press, 2015(MM).